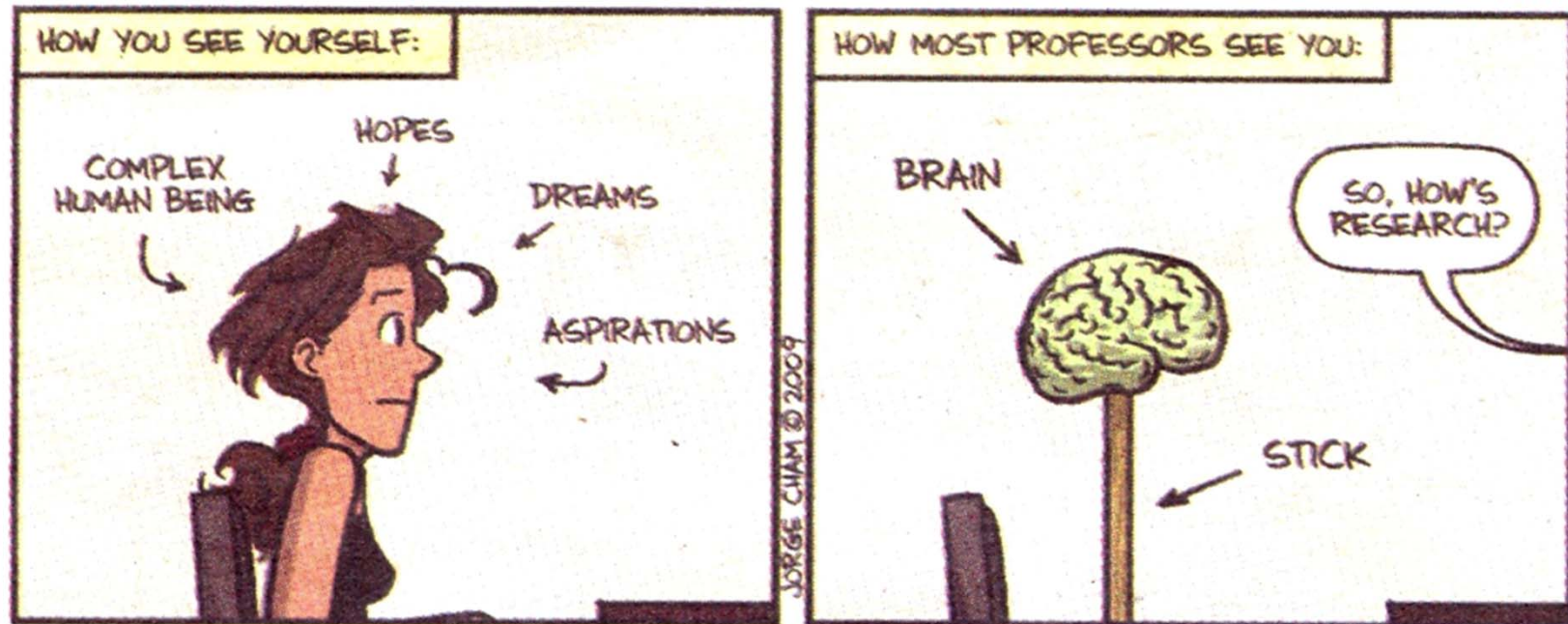


Finding an advisor and grad school advice



Finding an advisor

- **What does an advisor do?**
 - Guides your PhD research
 - Generally funds your research
 - Is the main editor of your PhD thesis
 - Helps you make contact with others in the scientific community
- **How many advisors are there at UIUC?**

Approx. 70-80 professors supervise students for physics PhD (not just in Physics!! ~15% of Physics grad students do research in other departments!)
- **How many students are there here?**
 - Approx. 280 students are seeking physics PhD (but most advanced grad students already have advisors)

Key decisions you'll need to make

1. What area of research interests you?

To be happy and successful in a longish (~5-6 years) grad school career, you **MUST** be driven by an important physics problem!

Astrophysics - Physical processes of planets, stars, galaxies,...

Atomic and Molecular Physics - Physics of atomic or molecular systems

Biophysics - Physical processes of biological molecules

Condensed Matter - Physics of materials, solid phases of matter

Nuclear/Medium Energy Physics - Physics of atomic nucleus, muons, protons, neutrons, other particles

Particle/High Energy Physics - Study fundamental constituents of matter

Physics Education Research - Study how we learn science concepts

Quantum Information - Study/Exploitation of quantum 'weirdness'

Key decisions you'll need to make

To be happy and successful in a longish (~5-6 years) grad school career, you **also** MUST get some enjoyment from the more mundane day-to-day activities associated with your research, NOT just the “big picture” goal of your research...

Do you want to be a theorist or an experimentalist?

Theorists must enjoy:

Analytical calculations

Mathematics

Developing models

Programming

Experimentalists must enjoy:

Equipment building and
troubleshooting

Electronics

Data Acquisition and Analysis

Programming

Key decisions you'll need to make

Are you interested in elements of both experiment and theory?

“Computational” Physicists must enjoy:

Mathematics

Developing and testing models

Programming and troubleshooting code

What Do Students Do at Illinois?

- About 40% of students do theory, 60% do experiment
- Of the students who change (theory to experiment) or (experiment to theory), most started in theory and change to experiment*

If you want to have elements of both theory and experiment in your research, generally speaking, it's probably a little easier to do theory as an experimentalist than to do experiments as a theorist (try computational physics if you like programming!).

*Beware attempting to join a theory group if you applied here expressing interest in experiment. Most past students attempting this have struggled!

Key decisions you'll need to make

What *style* of research/advisor interests you?

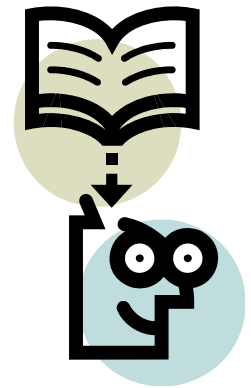
- Large collaborative project vs. Small individual project
(high energy/nuclear vs. condensed matter/biophysics)
- Pure subfield vs Interdisciplinary research
- “Hands on” advisor vs. “Hands off” advisor
- New project/lab vs Established project/lab

How can you tell what research you like?

- You just know
- Based upon classes you liked best or did well in
- From undergraduate research projects you liked or didn't like
- By seminars you see that inspired you (or didn't!)

Take advantage of this first semester/year to identify research areas that interest you:

- Attend seminars/colloquia:
<https://physics.illinois.edu/calendar/seminar>
- Explore the research websites:
<https://physics.illinois.edu/research/>
- Talk with faculty: <https://physics.illinois.edu/people/>
- Look for grad blog research postings:
<https://physics.illinois.edu/academics/graduates/blog/>



What advisors are looking for

Experimental advisors:

- Most experimental advisors would like, but don't require, laboratory experience...i.e., they will generally train you
- Those building a new lab – and those with more sophisticated experiments -- may want more experimental background in a new student
- In general, experimental advisors are less grade conscious and much less concerned with how you did on the qual
- They're less concerned with which courses you've taken, e.g., the Biophysicists/Condensed Matter/AMO experimentalists will accept you in their groups even if you have no Biology/Condensed Matter/AMO experience
- Will generally start you in the group with intro projects

What advisors are looking for

Theory advisors:

- Theory advisors are generally more grade-conscious, more likely to ask about qual results
- May want you to have more advanced courses (e.g., **quantum field theory**, etc.) before taking you as a student
- Generally want a strong math background
- Will generally evaluate you with “starter” problems before accepting you into the group
- Keep in mind that many theory groups (particularly in condensed matter) have many students and may be difficult to break into, *particularly if you have little or no prior theoretical research experience*

Some Tips

- Don't be too "calculating" about your decision: **research can be hard sometimes, so find something that excites/inspires you!!**
- Don't forget about opportunities outside the physics department (**Materials Science, Chemistry, Electrical Engineering, etc.**)
- Explore a little...don't assume you're sure you know what you want to do: **keep an open mind as you're watching the different research presentations in Phys 596**
- Don't assume a faculty member isn't looking for students if he/she doesn't give a 596 talk!
- Your quality of life has a definite impact on the quality of research you can do, so find an advisor and group environment you are comfortable with

More Tips

- Be a little practical: To do experimental research, it helps to have some mechanical aptitude. To do theoretical research, it helps to be strong analytically.
- Physics 597, Independent Study is a course and you'll get a grade! Take it seriously!
- If you start out in a group and are not happy, it is expected that you may switch, and switching is common
- The level of commitment increases with time in the group and with the degree to which you are supported by your advisor's research grants
- If you want advice on how to negotiate a group change, contact me

Goals and Time frames

- **Goal:** start an independent study with an advisor (Physics 597)
- **Time frames:**
 - Check out faculty research websites, attend seminars, start talking to faculty to narrow research focus in Fall 2019
 - Hang around the lab/group by Fall 2019 or Spring 2020
 - Try to start formally with a group by no later than Summer 2020

How to find an advisor

- Identify potential advisors
 - Look over their research pages on <https://physics.illinois.edu/research/>
 - Go to their seminars
 - Send them an e-mail to ask if you can meet to talk about their research
 - Talk with grad students of potential advisors to find out about style of research and group environment

Questions to ask a potential advisor

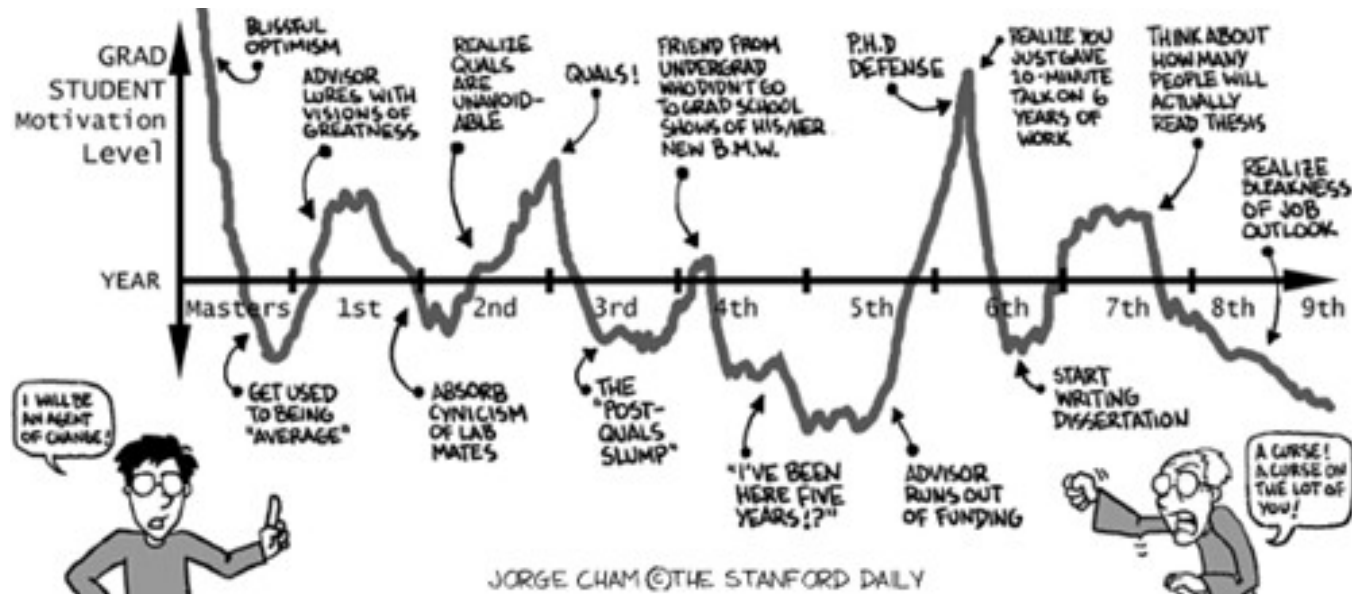
- Is he/she taking students? If “no”, then when will they take on students?
- Are the advisor’s research projects collaborative (multiple students), or does every student have his/her own project?
- Will you be expected to build a new apparatus (or write new code, perform a new calculation, etc.), or will you jump into the middle of a well-developed project that follows up another student’s research?
- Is it likely you’ll be constantly funded during your time with the group, or will you be expected to TA periodically?

How to find an advisor

- Once you've identified an advisor you're interested in, get your foot in the door
 - Ask about attending group meetings
 - Ask about getting involved with small projects, even if you're not funded
 - Start early (this semester, if possible, or next semester at the latest!)
 - There is no commitment (on either side) for you to stay with a group!

Research opportunities generally don't come to you...you need to be proactive and track down opportunities. Start early and get over any shyness talking to faculty...they don't bite!

Tips For Thriving in Graduate School



- Get used to the uneven pace of research: progress happens sporadically in grad school
- Don't compare yourself to others: getting your PhD is a marathon, not a sprint, and there's not a limit on the number of PhDs we give out
- Learn to pick up knowledge outside of classes: courses can be an inefficient way to learn while doing research

Tips For Surviving Graduate School

- Everyone has self-doubts and experiences frustration, so this is not unusual and you're not alone! Your confidence and ability to manage frustration will improve with time and effort.
- This is your PhD, so take charge of the process and take responsibility for knowing/following the requirements
- Be receptive to academic and research feedback from others.
- But don't be afraid to express your own views on the directions your research project should take!

Tips For Surviving Graduate School

- Take time off from research/studies! Socialize and enjoy your hobbies, etc.! You'll come back to research and studies with renewed energy and a fresh perspective.
- Take care of your physical and mental health: eat well, exercise, get sleep, and take advantage of campus/community [mental health resources](#) if needed.
- Communicate your feelings and concerns with your advisors, classmates, me, counselors, etc. We're here to help!